Best Practices When Implementing Technology in Education

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**Introduction**

As school boards boards implement technology policies into their schools, they must choose between a variety of formats of delivery. They must ask themselves what is the most comprehensive way to encourage digital literacy in a group of students with varying technological backgrounds? The purpose of this paper will be to assess best practices for implementing a technology plan within in a school. There is debate as to whether play-based learning with few guidelines is more appropriate or a more formal and structured way of exposing students to new forms of technology will result in a more solid understanding. There are many limitations to both theories. Play-based learning allows students to take new technology tools and expand their learning in a more personal fashion; however it lacks the structure that some students and situations require. An over-structured format for using technology also has its issues because it places limitations and enforces rules on use of technology, restricting imaginative use and deep understanding (Moody, 1999). The best way to encourage technological literacy for students is through opportunities for minimally structured play with systems, apps, devices and media (Moody, 1999; Zhao & Frank; Gee, 2008; Squire, 2008). If we want all students to be on relatively equal footing with respect to digital literacy, the schools need to support students by providing them with the time and tools to practice and to invent uses for different forms of technology.

**Background to thesis**

Schools have struggled with how to encourage technology use. There is a wide variety of ways that technology is used and no standard is established for how best to implement technology into schools or the classroom. Some of the issues with respect to implementing technology into schools are described by Moody (1999). Technology has become a “new environment which will require adaptations,” (Moody, 1999, p. 1), and we have to make decisions about how to adapt so that we are do not become passive users of technology. Technology moves at such a rapid rate that it is difficult to keep up to technological changes, and teacher’s viewpoints on media and technology will greatly impact how they will choose to use media and technology in the classroom (Zhao & Frank, 2003). Teachers are not likely to incorporate technology in a meaningful way if it is forced upon them by administrators, so encouraging individual use of technology in a safe and unstructured way is important (Zhao & Frank, 2003). Conlon relates some of the issues inherent to this massive shift that we are seeing in technology by asking, “what ways these changes should affect our vision for education,” (2000, p. 111). We are at a place in history where educators and society must decide how we want to incorporate technology into our education system, and should do so with a clear focus on what we want to achieve.

There are different thoughts on the way in which technology should be presented to students. Some advocate for structured use of technology, (Kay, 2011). Some recommend game-based learning (Gaa 2000, 2008; Kafai, 2006), as they have found that the opportunity to “play or ‘mess about,’” (Moody, 1999, p. 4), is an important policy in early education, and offers students the opportunity to come to realizations on their own, which could be applied to technological situations. Play is an area that has recently drawn a lot of interest in education, particularly in relation to video games and technology. The idea that play and the process of inquiry with respect to technology are important, as they make learning personal and meaningful is one way to address use in schools. In schools students are often given very structured opportunities to use and interact with technology. They are forced to use particular programs with very specific goals and free time is not necessarily encouraged.

There are economic, political, historical, philosophical and systemic reasons for the way technology is used within school systems. Technology is expensive and those who purchase it and use it are afraid of it being used inappropriately and perhaps ruined (Moody, 1999). Replacing technology is costly and those who do not understand it may not have the necessary tools to troubleshoot problems that arise as a result of use that falls outside of the normal pattern. Educators, administration and parents may not understand technology and be uncomfortable allowing students to use instruments whose capabilities they do not understand. Student safety with respect to being online is a major concern, as is privacy with respect to distribution of film or pictures of students/student work. With technology comes a change in power within schools systems and this can be uncomfortable for those who do not wish it to change, (Gee, 2000). Additionally, there are some philosophical concerns (Conlon, 2000; Kafai, 2006), specifically with respect to valuing the process of learning information, which place barriers on the incorporation of technology in schools. Other concerns include students losing time or focus for other curriculum activities as technology becomes an important part of their learning (Moody, 1999).

Technology in schools raises concerns about who will pay for it, who will choose it, how it will be used, who will use it and what will happen if things go wrong. Each of these areas of concern needs to be addressed by a technological policy for it to be implemented appropriately and sustainably to allow students to be digitally literate. However, if we want students to move beyond being simple users of technology, to being able to really understand technology, this shift is worth the time and money.

**Rationale**

By looking at literature I will investigate whether an unstructured learning environment, with respect to technology, is the best way to encourage digital literacy and lifelong technological competency. I will address some of the issues behind technology implementation in schools that become apparent through the literature while seeking to find the most effective way to encourage technology use.

**Review of Literature**

Zhao and Frank (2003), recommend that teachers are given opportunities for unstructured use of technology to allow them to be comfortable with technology and incorporate it into their classroom in ways which are meaningful for them. According to Zhao and Frank (2003), these scenarios are the ones most likely to indicate future use and an individual’s general outlook with respect to technology. Moody relates the same need for “play and experimentation,” (1999, p. 108), and describes students who were given technology “without any rules or reservations,” (1999, p. 116). These students were able to produce work that was well above grade level expectations and met industry standards for media work (Moody, 1999). Students left school with a portfolio of work which represented their abilities in certain types of media and their transferrable skills (Moody, 1999).

Kay introduces a system for assessing the use of web-based learning tools, “based on three key constructs…learning, design and engagement,” (Kay & Knack 2005, 2007, 2008, 2009, in Kay, 2011, p. 1850). Kay (2011), also mentions that there is difficulty when doing any research in this area as teacher’s use, types of activities, and time spent in the classroom on web-based learning tools are widely varied from teacher to teacher.

Conlon questions the purposes behind introducing information technology in schools and believes that, “the design and selection of technology ought to reflect our beliefs about the purpose of education,” (2000, p. 114). If we believe that education is to prepare students for a specific outcome we would require more specific task completion and more structure. If we want learners who are competent and able to adapt and be flexible we should support forms of usage and technology which will foster this. Since the workplace of the future will require adaptability and flexibility (Squire, 2008), our education system should support these skills.

Kafai (2006), suggests that there are two methods of using games in classrooms, one where teachers use games to teach and another where students reach learning by making their own games; respectively the instructionist and constructivist approaches to educational gaming. Instructionist approaches to gaming will allow students the opportunity to learn curriculum content through game formats, which is useful for teachers looking for alternate ways to share content. Constructivist approaches will allow students the flexibility to be creative and time spent on these will be more indicative of student’s own interests and abilities with technology.

Kozma (1994), relates that success can be found by using technology to solve real-world problems. He provides examples of these types of situations, first by relating a case study of forces and motion being taught through a computer program called Thinker-Tools (Kozma, 1994). The second case study that Kozma examines is one in which students use videodisk situations to solve realistic problems, (1994). In both cases it is important that students are required to complete a specific task and Kozma believes that technology is the medium to impart information, not the message in itself (1994). Kozma states that “understanding the ways in which students use the unique processing capabilities of the computer is essential to understanding the influence computers may have on learning,” (1994, p.13-14). Squire (2008), investigates the use of games in education. He presents theories on how education is shifting from content to context and how this makes video games and simulations a good fit for where education is headed. Gee (2008), also looks at the use of simulations and games to enhance learner’s experience, by allowing them to try on different roles.

All researchers, besides Kay (2011), found benefits from using play-based learning. In every situation researchers found that allowing freedom to try things, take risks and make mistakes was beneficial in encouraging learning and competency with technology.

**Preliminary Findings**

A less rigid type of learning allows students to broaden their own context and take positive risks. Incorporating a sense of purpose when assigning projects and linking with curriculum (Moody, 1999; Kozma, 1994), are important considerations when setting up a technology program within a school. Whether teachers are using gaming, television, or some other form of technology, a recurring theme is that the teacher will directly impact every aspect of technology implementation from choosing the type that is used straight through to assessing its use.

**Implications**

Although unstructured use of technology can allow learners to expand their learning and knowledge with a particular technology (Zhao, 2003), the most effective way to expose students to new forms of technology is to incorporate some aspects of direct teaching, specific guidelines, and limitations of use. Without having a framework, students are less likely to begin engaging in a task in a meaningful way (Squire, 2008). In the case of Moody (1999), students who were given the opportunity to play with technology were also able to translate their learning to other forms of media or technology. The motivations for using these technologies “originated inside the individual,” (Moody, 1999, p. 118). Kay notes that “decisions on how to use…tools may have considerable more import than the tools themselves,” (2011, p. 1854). While unstructured play might be the ideal, within the schools a compromise between play and direct teaching may better meet the school’s needs.

A major issue with respect to district or school policies will be ensuring that teachers have opportunities at every point to be involved. When districts are making technology plans they should involve teachers in choosing which types of technology will be purchased, how the technology will be used and how its use will be assessed. Some formats for assessment have been discussed, and both qualitative and quantitative data will be important in identifying effective use within a school (Moody 1999; Kay, 2011). It is clear that teachers need to be the driving force behind the choices that are made, however, this discussion should involve parents, administrators and should be done within the context of the learner, “to stimulate new ways of thinking, acting and being in the world,” (Squire, 2008, p. 14-15).

Allowing for greater freedom in technology use (Moody, 1999), and ensuring that its purpose is clear (Conlon, 2000), seem to be the most effective ways to guarantee that students are raised with the ability to both be technologically literate and to understand the reasons behind their technology use. Time as well as the ability to make errors and troubleshoot are two things integral to play, and the ability to take risks and “practice failure,” (Squire, 2008, p. 22) are important aspects in implementing technology in an educational setting.

Administrators and school boards are hesitant to spend technology dollars without being assured of outcomes. And it is difficult to suggest technology uses that do not clearly demonstrate that technology is being used to its full potential. Here is where a major problem lies. If the focus is on data collection and function-based uses of technology the result is learners who understand how to accomplish tasks, but not learners who can really understand the full potential of technology. Within the current framework, there is no opportunity for students to share or make individual connections to technology, and their digital literacy cannot be achieved. It is also important to keep some aspects of explicit teaching within technology use. Explicit teaching will allow students the opportunity to be exposed to technology and ensure that students do not become overly frustrated with a system that they do not understand. If learners are not made comfortable with basic functions it is less likely that they will be willing to take risks and “our methods [may not] take appropriate advantage of a medium’s capabilities,” (Kozma, 1994, p. 16).

Assessing technology use will still be important, although it should not be the initial aim of learning. Additionally districts will need to see that there are different ways to facilitate learning, and “best practices” will need to be established and followed so that it can be ensured that policies are “based on those conditions under which learning *will* occur,” (Kozma, 1994, p. 14). Anecdotal evidence may be an effective way to get around assessing unstructured opportunities for technology use, as might student questionnaires. Allowing students different opportunities to use technology, both ones whose purpose is defined like completing assignments, and chances to have unstructured time with different forms of technology are integral to the success of technology implementation. In some cases data collection might be an effective way to measure some more formal types of technology use. For example, hours logged in, or assignments completed, could demonstrate effective use of time.

Without time to play, students may complete certain functions without understanding why or how they are doing it. Without pedagogy that is both pro-technology and pro-play, students will not be exposed to this kind of environment. Without free access to technology, students will be limited in their ability to engage in the “conversation between the designer and the intended users,” (Kozma, 1994, p. 17).

In conclusion, play given within some guidelines with direct teaching to scaffold the experience is the most effective way of encouraging technological literacy. Two major ways to approach technology use are through problem-based assignments, like those described by Kozma (1994), or through “context creation,” (2008, p.16), as described by Squire. In both cases students are using technology as a way to interact with a problem. The focus still includes some aspects of content but transcends this to allow students to create their own solutions and, in the case of newer forms of media, “to participate in constructing the learning environment,” (Squire, 2008, p.18). This ensures that that students are able to meet the rapidly changing demands in their future environments.

**Recommendations**

Further investigation into specific case studies or further research could provide insight as to how to realistically implement a technology policy within a school. Specific examples on when technology should be used and what kind of budget would be required are important points to consider. Although it is clear that competency in one type of technology will generally lead to the ability to use another, as some skills or patterns of activity learned will be applicable, there will be a minimal amount of technology that would be required to encourage student learning. Establishing how much technology exposure might constitute an appropriate amount to ensure the learning of transferrable skills, could aid in creating budgets and best practices (Squire, 2008). Additionally, evaluation is a consideration that would warrant much time. Students can easily be evaluated on how well they meet other curriculum requirements through the use of technology; however, evaluating student ability to use technology is more difficult. Kay (2011), begins to address this, but more investigation into this area is required. This paper has addressed which format is most effective, but individual teaching styles will still affect the outcome greatly. Professional development would then be an important consideration when researching technology within a school or school district, as it directly will affect the types of and ways that technology is implemented in a classroom.

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